III. APPLICABLE PLANS, POLICIES, AND REGULATIONS

The requirements contained in this Order are based on the applicable plans, policies, and regulations identified in the Findings in section II of this Order. The applicable plans, policies, and regulations relevant to the discharge include the following:

A. Legal Authorities

This Order is issued pursuant to regulations in the Clean Water Act (CWA) and the California Water Code (CWC) as specified in the Finding contained at section II.C of this Order.

B. California Environmental Quality Act (CEQA)

This Order meets the requirements of CEQA as specified in the Finding contained at section II.E of this Order.

C. State and Federal Regulations, Policies, and Plans

1. **Water Quality Control Plans.** This Order implements the following water quality control plans as specified in the Finding contained at section II.H of this Order.

   a. *Water Quality Control Plan, Fourth Edition (Revised October 2007), for the Sacramento and San Joaquin River Basins* (Basin Plan)

   b. *Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Water and Enclosed Bays and Estuaries of California (Thermal Plan)*

   For purposes of the Thermal Plan, the Discharger is considered to be an Existing Discharger of Elevated Temperature Waste. The Thermal Plan in section 5.A. contains the following temperature objectives for surface waters that are applicable to this discharge:

   "5. Estuaries
   A. Existing discharges
   (1) Elevated temperature waste discharges shall comply with the following:
   a. The maximum temperature shall not exceed the natural receiving water temperature by more than 20°F.

   b. Elevated temperature waste discharges either individually or combined with other discharges shall not create a zone, defined by water temperatures of more than 1°F above natural receiving water temperature, which exceeds 25 percent of the cross-sectional area of a main river channel at any point.

   c. No discharge shall cause a surface water temperature rise greater than 4°F above the natural temperature of the receiving waters at any time or place.

d. *Additional limitations shall be imposed when necessary to assure protection of beneficial uses.*

c. *Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary (Bay-Delta Plan)*

2. **National Toxics Rule (NTR) and California Toxics Rule (CTR).** This Order implements the NTR and CTR as specified in the Finding contained at section II.I of this Order.

3. **State Implementation Policy (SIP).** This Order implements the SIP as specified in the Finding contained at section II.J of this Order.

4. **Alaska Rule.** This Order is consistent with the Alaska Rule as specified in the Finding contained at section II.L of this Order.

5. **Antidegradation Policy.** As specified in the Finding contained at section II.N of this Order and as discussed in detail in this Fact Sheet (Section IV.D.4.), the discharge is consistent with the antidegradation provisions of 40 CFR section 131.12 and State Water Resources Control Board (State Water Board) Resolution 68-16.

6. **Anti-Backsliding Requirements.** This Order is consistent with anti-backsliding policies as specified in the Finding contained at section II.O of this Order. Compliance with the anti-backsliding requirements is discussed in this Fact Sheet (Section IV.D.3).

7. **Emergency Planning and Community Right to Know Act**

   Section 13263.6(a) of the CWC, requires that "*the Regional Water Board shall prescribe effluent limitations as part of the waste discharge requirements of a POTW for all substances that the most recent toxic chemical release data reported to the state emergency response commission pursuant to Section 313 of the Emergency Planning and Community Right to Know Act of 1986 (42 U.S.C. Sec. 11023) (EPCRA) indicate as discharged into the POTW, for which the State Water Board or the Regional Water Board has established numeric water quality objectives, and has determined that the discharge is or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to, an excursion above any numeric water quality objective*".

   The most recent toxic chemical data report does not indicate any reportable off-site releases or discharges to the collection system for this Facility. Therefore, a reasonable potential analysis based on information from EPCRA cannot be conducted. Based on information from EPCRA, there is no reasonable potential to cause or contribute to an excursion above any numeric water quality objectives included within the Basin Plan or in any State Water Board plan, so no effluent limitations are included in this permit pursuant to CWC section 13263.6(a).

   However, as detailed elsewhere in this Order, available effluent data indicate that there are constituents present in the effluent that have a reasonable potential to cause or contribute to exceedances of water quality standards and require inclusion of effluent limitations based on federal and state laws and regulations.

8. **Storm Water Requirements**

   USEPA promulgated federal regulations for storm water on 16 November 1990 in 40 CFR Parts 122, 123, and 124. The NPDES Industrial Storm Water Program regulates storm water discharges from wastewater treatment facilities. Wastewater treatment plants are applicable industries under the storm water program and are obligated to comply with the federal regulations.

9. **Endangered Species Act.** This Order is consistent with the Endangered Species Act as specified in the Finding contained at section II.P of this Order.

D. Impaired Water Bodies on CWA 303(d) List

Under section 303(d) of the 1972 CWA, states, territories and authorized tribes are required to develop lists of water quality limited segments. The waters on these lists do not meet water quality standards, even after point sources of pollution have installed the minimum required levels of pollution control technology. On 30 November 2006 USEPA gave final approval to California's 2006 section 303(d) List of Water Quality Limited Segments. The Basin Plan references this list of Water Quality Limited Segments (WQLSs), which are defined as "*...those sections of lakes, streams, rivers or other fresh water bodies where water quality does not meet (or is not expected to meet) water quality standards even after the application of appropriate limitations for point sources* (40 CFR Part 130, et seq.)." The Basin Plan also states, "*Additional treatment beyond minimum federal standards will be imposed on dischargers to [WQLSs]. Dischargers will be assigned or allocated a maximum allowable load of critical pollutants so that water quality objectives can be met in the segment.*" The listing for the southern portion of the Sacramento-San Joaquin Delta includes: chloropyrifos, DDT, diazinon, electrical conductivity, exotic species, group A pesticides, mercury, and unknown toxicity.

E. Total Maximum Daily Loads (TMDLs).

USEPA requires the Regional Water Board to develop TMDLs for each 303(d) listed pollutant and water body combination. The TMDL for organophosphate pesticides (diazinon and chlorpyrifos) was adopted on 23 June 2006, which established objectives in part to the segment of the San Joaquin River in the southern Sacramento-San Joaquin Delta from the Mendota Dam to Vernalis. Discharge Point 001 is approximately 15 miles downstream of Vernalis, and therefore, the TMDL for organophosphates is not applicable to the discharge. The TMDL for Group A organochlorine pesticides is scheduled for the year 2011. The mercury and methylmercury TMDL is still in development; a TMDL control program has not been adopted nor approved.

The 303(d) listings and TMDLs have been considered in the development of the Order. A pollutant-by-pollutant evaluation of each pollutant of concern is described in section IV.C.3. of this Fact Sheet. The Discharger is required to monitor for these constituents as described in the Monitoring and Report Program of this Order (Attachment E).

F. Other Plans, Polices and Regulations

Title 27, California Code of Regulations (CCR), section 20005 *et seq.* (hereafter Title 27) Discharges of wastewater to land, including but not limited to evaporation ponds or percolation ponds, are exempt from the requirements of Title 27, CCR, based on section 20090 *et seq.* The Facility contains storage facilities and agricultural reuse fields where a determination has been made by the Central Valley Water Board whether the facilities meet the exemptions from Title 27. These facilities include the Secondary Effluent Equalization Pond (SEEP), Secondary Effluent Storage Pond (SESP), Food Receiving and Processing Wastewater Pond, and the Land Application Areas. The Regional Water Board's findings regarding Title 27 exemptions are discussed below.

1. **Secondary Effluent Equalization Pond (SEEP).** The SEEP is exempt from the requirements of Title 27, pursuant to Title 27 CCR section 20090(a). Provision H.4 of Order No. R5-2004-0028 required the Discharger to construct additional storage facilities to demonstrate adequate storage capacity of treated domestic sewage so the discharge to the San Joaquin River could be ceased during periods of incoming tides. The SEEP was constructed to comply with Provision H.4, and therefore, is a necessary part of the Facility's wastewater treatment system. Secondary effluent may be stored in the SEEP prior to tertiary-level treatment and discharge to the San Joaquin River. The SEEP is fully tetra-lined.

2. **Food Receiving and Processing Wastewater Pond.** The Facility accepts food-processing wastewater from Eckert Cold Storage through a separate influent collection line. The wastewater does not go to the headworks of the WQCF. Eckert Cold Storage is a seasonal discharger that processes frozen vegetables, cabbage, and a variety of peppers. Eckert Cold Storage treats the food-processing wastewater by screening, DAF system, and pH neutralization before discharging to the Facility. The Facility stores and aerates the treated food processing wastewater in the Food Receiving and Processing Wastewater Pond, which is a tetra-lined pond (sides walls and bottom are lined). The Discharger also provides chemical addition in the pond for odor control and additional treatment.

   The wastewater does not need to be managed as hazardous waste, and because the pond is lined, the relatively minimal discharge to groundwater would have little effect to cause to exceed applicable water quality objectives. Thus, the discharge to the pond is in compliance with the applicable water quality control plan. Based on these findings the Food Receiving and Processing Wastewater Pond is exempt from the requirements of Title 27 CCR, pursuant to Title 27 CCR section 20090(b).

3. **Secondary Effluent Storage Pond (SESP).** The SESP holds only secondary effluent that has been treated at the Facility. The SESP has rip/rap sidings and an unlined bottom; therefore, wastewater contained in the SESP potentially percolates to the underlying groundwater. Monitoring data obtained from the secondary effluent discharged to land, which is representative of the discharges to SESP, indicate that some constituents do not comply with the applicable water quality control plan. For example, the Basin Plan contains narrative objectives for chemical constituents, tastes and odors, and toxicity of groundwater. The chemical constituent objective

states groundwater shall not contain chemical constituents in concentrations that adversely affect any beneficial use. Electrical conductivity (EC) and total dissolved solids (TDS), which were found in the representative samples at monthly average effluent concentrations of 817 μmhos/cm and 575 mg/L, respectively, have the ability to degrade the underlying groundwater quality and thereby impairing agricultural use of the groundwater. However, groundwater monitoring data has not been obtained to determine whether any attenuation beneath SESP has occurred. But based on the monitoring results of the representative samples, the wastewater in the SESP does not need to be managed as Hazardous Waste. Until the Discharger provides further information (e.g. underlying groundwater monitoring data or a site-specific study to determine the appropriate EC or TDS levels to protect the agricultural beneficial use in the vicinity of the Facility), the Regional Water Board cannot determine whether the wastewater stored in SESP, and thus the underlying groundwater, comply with the applicable water quality control plan. Because compliance cannot be determined immediately, this Order includes a compliance schedule to determine compliance with the applicable water quality control plan.

4. **Land Application.** During the agricultural season (about late April through early October), the Discharger either directly irrigates agricultural fields with the treated food processing wastewater, or blends this treated food processing wastewater with secondary treated municipal effluent before reusing the wastewater on land. Machado Dairy Farm and Dutra Farms use these reclaimed wastewaters for irrigation purposes on the agricultural fields to grow dairy feed. Both farmers have rights to other source water; however; this source water is obtained from a local reservoir that is of higher-quality and used as municipal drinking water source for several local municipalities, including the City of Manteca. Therefore, use of reclaimed wastewater for irrigation purposes on agricultural fields to grow dairy feed, in this case, serves to conserve valuable surface water drinking water supplies. Moreover, both farmers must grow the feed for the dairy cows, and thus purchasing the feed instead would cause a financial hardship. In addition, because both farmers are family owned businesses, purchasing feed would most-likely cause a family member to lose their position and thereby placing additional financial hardships. Furthermore, purchasing the feed would also raise operating costs, which could potentially raise the cost of the milk produced and thereby make the farms less competitive. The reuse of treated wastewater on the agricultural fields is exempt from Title 27 pursuant to Section 20090(h).

IV. RATIONALE FOR EFFLUENT LIMITATIONS AND DISCHARGE SPECIFICATIONS

Effluent limitations and toxic and pretreatment effluent standards established pursuant to sections 301 (Effluent Limitations), 302 (Water Quality Related Effluent Limitations), 304 (Information and Guidelines), and 307 (Toxic and Pretreatment Effluent Standards) of the CWA and amendments thereto are applicable to the discharge.

The CWA mandates the implementation of effluent limitations that are as stringent as necessary to meet water quality standards established pursuant to state or federal law [33 U.S.C., §1311(b)(1)(C); 40 CFR 122.44(d)(1)]. NPDES permits must incorporate discharge limits necessary to ensure that water quality standards are met. This requirement applies to narrative criteria as well as to criteria specifying maximum amounts of particular pollutants. Pursuant to federal regulations, 40 CFR 122.44(d)(1)(i), NPDES permits must contain limits that control all pollutants that "*are or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to an excursion above any state water quality standard, including state narrative criteria for water quality.*" Federal regulations, 40 CFR 122.44(d)(1)(vi), further provide that "[w]*here a state has not established a water quality criterion for a specific chemical pollutant that is present in an effluent at a concentration that causes, has the reasonable potential to cause, or contributes to an excursion above a narrative criterion within an applicable State water quality standard, the permitting authority must establish effluent limits.*"

The CWA requires point source dischargers to control the amount of conventional, non-conventional, and toxic pollutants that are discharged into the waters of the United States. The control of pollutants discharged is established through effluent limitations and other requirements in NPDES permits. There are two principal bases for effluent limitations in the Code of Federal Regulations: 40 CFR 122.44(a) requires that permits include applicable technology-based limitations and standards; and 40 CFR 122.44(d) requires that permits include WQBELs to attain and maintain applicable numeric and narrative water quality criteria to protect the beneficial uses of the receiving water where numeric water quality objectives have not been established. The Basin Plan at page IV-17.00, contains an implementation policy, "*Policy for Application of Water Quality Objectives*", that specifies that the Regional Water Board "*will, on a case-by-case basis, adopt numerical limitations in orders which will implement the narrative objectives.*" This Policy complies with 40 CFR 122.44(d)(1). With respect to narrative objectives, the Regional Water Board must establish effluent limitations using one or more of three specified sources, including: (1) USEPA's published water quality criteria, (2) a proposed state criterion (i.e., water quality objective) or an explicit state policy interpreting its narrative water quality criteria (i.e., the Regional Water Board's "*Policy for Application of Water Quality Objectives*")(40 CFR 122.44(d)(1)(vi)(A), (B) or (C)), or (3) an indicator parameter.

The Basin Plan includes numeric site-specific water quality objectives and narrative objectives for toxicity, chemical constituents, discoloration, radionuclides, and tastes and odors. The narrative toxicity objective states: "*All waters shall be maintained free of toxic substances in concentrations that produce detrimental physiological responses in human, plant, animal, or aquatic life.*" (Basin Plan at III-8.00.) The Basin Plan states that material and relevant information, including numeric criteria, and recommendations from other agencies and scientific literature will be utilized in evaluating compliance with the narrative toxicity objective. The narrative chemical constituents objective states that waters shall not contain chemical constituents in concentrations that adversely affect beneficial uses. At minimum, "*...water designated for use as domestic or municipal supply (MUN) shall not contain concentrations of chemical constituents in excess of the maximum contaminant levels (MCLs)" in Title 22 of CCR.* The Basin Plan further states that, to protect all beneficial uses, the Regional Water Board may apply limits more stringent than MCLs. The narrative tastes and odors objective states: "*Water shall not contain taste- or odor-producing substances in concentrations that impart undesirable tastes or odors to domestic or municipal water supplies or to fish flesh or other edible products of aquatic origin, or that cause nuisance, or otherwise adversely affect beneficial uses.*"

A. Discharge Prohibitions

1. **Prohibition III.A (No discharge or application of waste other than that described in this Order).** This prohibition is based on CWC Section 13260 that requires filing of a report of waste discharge (ROWD) before discharges can occur. The Discharger submitted a ROWD for the discharges described in this Order; therefore, discharges not described in this Order are prohibited

2. **Prohibition III.B (No bypasses or overflow of untreated wastewater, except under the conditions at CFR Part 122.41(m)(4)).** As stated in section I.G of Attachment D, Standard Provisions, this Order prohibits bypass from any portion of the treatment facility. Federal regulations, 40 CFR 122.41(m), define "bypass" as the intentional diversion of waste streams from any portion of a treatment facility. This section of the federal regulations, 40 CFR 122.41(m)(4), prohibits bypass unless it is unavoidable to prevent loss of life, personal injury, or severe property damage. In considering the Regional Water Board's prohibition of bypasses, the State Water Board adopted a precedential decision, Order No. WQO 2002-0015, which cites the federal regulations, 40 CFR 122.41(m), as allowing bypass only for essential maintenance to assure efficient operation.

3. **Prohibition III.C (No controllable condition shall create a nuisance).** This prohibition is based on CWC Section 13050 that requires water quality objectives established for the prevention of nuisance within a specific area. The Basin Plan prohibits conditions that create a nuisance.

4. **Prohibition III.D (No inclusion of pollutant free wastewater shall cause improper operation of the Facility's systems).** This prohibition is based on CFR Part 122.41 et seq. that requires the proper design and operation of treatment facilities.

5. **Prohibition III.E.** (No discharge of hazardous or designated wastes, as classified under Title 23 CCR Chapter 15, Section 2521; or CWC Section 13173, respectively) This prohibition is necessary to protect the beneficial uses of the surface and groundwater beneficial uses.

B. Technology-Based Effluent Limitations

1. Scope and Authority

Regulations promulgated in 40 CFR 125.3(a)(1) require technology-based effluent limitations for municipal Dischargers to be placed in NPDES permits based on Secondary Treatment Standards or Equivalent to Secondary Treatment Standards.

The Federal Water Pollution Control Act Amendments of 1972 (PL 92-500) established the minimum performance requirements for POTWs [defined in section 304(d)(1)]. Section 301(b)(1)(B) of that Act requires that such treatment works must, as a minimum, meet effluent limitations based on secondary treatment as defined by the USEPA Administrator.

Based on this statutory requirement, USEPA developed secondary treatment regulations, which are specified in 40 CFR Part 133. These technology-based regulations apply to all municipal wastewater treatment plants and identify the minimum level of effluent quality attainable by secondary treatment in terms of 5-day biochemical oxygen demand (BOD_5), total suspended solids (TSS), and pH.

2. **Applicable Technology-Based Effluent Limitations**

   a. **BOD_5 and TSS.** Federal regulations, 40 CFR Part 133, establish the minimum weekly and monthly average level of effluent quality attainable by secondary treatment for BOD_5 and TSS. Tertiary treatment is necessary to protect the beneficial uses of the receiving stream and the final effluent limitations for BOD_5 and TSS are based on the technical capability of the tertiary process. BOD_5 is a measure of the amount of oxygen used in the biochemical oxidation of organic matter. The secondary and tertiary treatment standards for BOD_5 and TSS are indicators of the effectiveness of the treatment processes. The principal design parameter for wastewater treatment plants is the daily BOD_5 and TSS loading rates and the corresponding removal rate of the system. In applying 40 CFR Part 133 for weekly and monthly average BOD_5 and TSS limitations, the application of tertiary treatment processes results in the ability to achieve lower levels for BOD_5 and TSS than the secondary standards currently prescribed. The previous Order No. R5-2004-0028 prescribed the 30-day average BOD_5 and TSS limitations at 10 mg/L; this Order carries over those limitations, which is technically based on the capability of a tertiary system. In addition to the average weekly and average monthly effluent limitations, a daily maximum effluent limitation for BOD_5 and TSS is included in the Order to ensure that the treatment works are not organically overloaded and operate in accordance with design capabilities. In addition, 40 CFR 133.102, in describing the minimum level of effluent quality attainable by secondary treatment, states that the 30-day average percent removal shall not be less than 85 percent. If 85 percent removal of BOD_5 and TSS must be achieved by a secondary treatment plant, it must also be achieved by a tertiary (i.e., treatment beyond secondary level) treatment plant. This Order contains a limitation requiring an average of 85 percent removal of BOD_5 and TSS over each calendar month.

   b. **Flow.** The Facility was designed to provide a tertiary level of treatment for up to a design flow of 9.87 mgd. Therefore, this Order contains an average dry weather discharge flow effluent limit of 9.87 mgd. When the Facility's expansion projects for a design flow up to 17.5 mgd are complete and the Discharger complies with the conditions set forth in Special Provisions VI.C.6.c., this Order allows an increased average dry weather discharge flow effluent limit of 17.5 mgd (see section IV.D.3 of this Fact Sheet for detailed discussion).

   c. **pH.** The secondary treatment regulations at 40 CFR Part 133 also require that pH be maintained between 6.0 and 9.0 standard units.

**Summary of Technology-based Effluent Limitations
Discharge Point No. 001**

Table F-3. Summary of Technology-based Effluent Limitations

Parameter	Units	Effluent Limitations				
		Average Monthly	Average Weekly	Maximum Daily	Instantaneous Minimum	Instantaneous Maximum
BOD 5-day @ 20°C	mg/L	10	15	20		
Total Suspended Solids	mg/L	10	15	20		
pH[1]	Standard Units				6.0	9.0
85% Removal of BOD 5-day @ 20°C and Total Suspended Solids						

[1] This Order requires more stringent water quality-based effluent limits for pH. The pH is required to be maintained between 6.5 and 8.0 for protection of beneficial uses.

C. Water Quality-Based Effluent Limitations (WQBELs)

1. Scope and Authority

Section 301(b) of the CWA and 40 CFR 122.44(d) require that permits include limitations more stringent than applicable federal technology-based requirements where necessary to achieve applicable water quality standards. This Order contains requirements, expressed as a technology equivalence requirement, more stringent than secondary treatment requirements that are necessary to meet applicable water quality standards. The rationale for these requirements, which consist of tertiary treatment or equivalent requirements, is discussed in section IV.C.3 of this Fact Sheet.

40 CFR 122.44(d)(1)(i) mandates that permits include effluent limitations for all pollutants that are or may be discharged at levels that have the reasonable potential to cause or contribute to an exceedance of a water quality standard, including numeric and narrative objectives within a standard. Where reasonable potential has been established for a pollutant, but there is no numeric criterion or objective for the pollutant, WQBELs must be established using: (1) USEPA criteria guidance under CWA section 304(a), supplemented where necessary by other relevant information; (2) an indicator parameter for the pollutant of concern; or (3) a calculated numeric water quality criterion, such as a proposed state criterion or policy interpreting the state's narrative criterion, supplemented with other relevant information, as provided in 40 CFR 122.44(d)(1)(vi).

The process for determining reasonable potential and calculating WQBELs when necessary is intended to protect the designated uses of the receiving water as specified in the Basin Plan, and achieve applicable water quality objectives and criteria that are contained in other state plans and policies, or any applicable water quality criteria contained in the CTR and NTR.

2. Applicable Beneficial Uses and Water Quality Criteria and Objectives

The Basin Plan designates beneficial uses, establishes water quality objectives, and contains implementation programs and policies to achieve those objectives for all waters addressed through the plan. In addition, the Basin Plan implements State Water Board Resolution No. 88-63, which established state policy that all waters, with certain exceptions, should be considered suitable or potentially suitable for municipal or domestic supply.

The Basin Plan on page II-1.00 states: "*Protection and enhancement of existing and potential beneficial uses are primary goals of water quality planning...*" and with respect to disposal of wastewaters states that "*...disposal of wastewaters is [not] a prohibited use of waters of the State; it is merely a use which cannot be satisfied to the detriment of beneficial uses.*"

The federal CWA section 101(a)(2), states: "*it is the national goal that wherever attainable, an interim goal of water quality which provides for the protection and propagation of fish, shellfish, and wildlife, and for recreation in and on the water be achieved by July 1, 1983.*" Federal Regulations, developed to implement the requirements of the CWA, create a rebuttable presumption that all waters be designated as fishable and swimmable. Federal Regulations, 40 CFR sections 131.2 and 131.10, require that all waters of the State regulated to protect the beneficial uses of public water supply, protection and propagation of fish, shell fish and wildlife, recreation in and on the water, agricultural, industrial and other purposes including navigation. Section 131.3(e), 40 CFR, defines existing beneficial uses as those uses actually attained after 28 November 1975, whether or not they are included in the water quality standards. Federal Regulation, 40 CFR section 131.10 requires that uses be obtained by implementing effluent limitations, requires that all downstream uses be protected and states that in no case shall a state adopt waste transport or waste assimilation as a beneficial use for any waters of the United States.

a. **Receiving Water and Beneficial Uses.** The receiving stream is a tidally influenced section of the San Joaquin River located within the Sacramento-San Joaquin Delta Waterways, approximately one mile upstream of DWR's Mossdale Bridge monitoring station.

   Beneficial uses applicable to the San Joaquin River within the Sacramento-San Joaquin Delta are as follows:

Table F-4. Basin Plan Beneficial Uses

Discharge Point	Receiving Water Name	Beneficial Use(s)
001	San Joaquin River within the Sacramento-San Joaquin Delta	Existing: Municipal and domestic supply (MUN); agricultural supply, including irrigation and stock watering (AGR); industrial process supply (PROC); industrial service supply (IND); water contact recreation, including canoeing and rafting (REC-1); non-contact water recreation (REC-2); warm freshwater habitat (WARM); cold freshwater habitat (COLD); migration of aquatic organisms, warm and cold (MIGR); spawning, reproduction, and/or early development, warm and cold (SPWN); wildlife habitat (WILD); and navigation (NAV).

b. **Effluent and Ambient Background Data.** Because the Facility has undergone major upgrades (See section II of this Fact Sheet), the reasonable potential analysis (RPA), as described in section IV.C.3 of this Fact Sheet, for inorganics and non-conventional pollutants was based on effluent data from September 2007 through August 2008, which was submitted in the Discharger's self-monitoring reports. The RPA for the remaining effluent monitoring results and for the ambient background monitoring results were based on data from 27 April 2004 through 30 December 2008 because only a single sampling per constituent was obtained since Facility upgrades, which is insufficient data to perform an RPA.

c. **Hardness-Dependent CTR Metals Criteria.** The *California Toxics Rule* (CTR) and the *National Toxics Rule* (NTR) contain water quality criteria for seven metals that vary as a function of hardness. The lower the hardness the lower the water quality criteria. The metals with hardness-dependent criteria include cadmium, copper, chromium III, lead, nickel, silver, and zinc.

This Order has established the criteria for hardness-dependent metals based on the reasonable worst-case ambient hardness as required by the SIP[1], the CTR[2] and State Water Board Order No. WQO 2008-0008 (City of Davis). The SIP and the CTR require the use of "receiving water" or "actual ambient" hardness, respectively, to determine effluent limitations for these metals. (SIP, § 1.2; 40 CFR § 131.38(c)(4), Table 4, note 4.) The CTR does not define whether the term "ambient," as applied in the regulations, necessarily requires the consideration of upstream as opposed to downstream hardness conditions. In some cases, the hardness of effluent discharges changes the hardness of the ambient receiving water. Therefore, where reliable, representative data are available, the hardness value for calculating criteria can be the downstream

[1] The SIP does not address how to determine the hardness for application to the equations for the protection of aquatic life when using hardness-dependent metals criteria. It simply states, in Section 1.2, that the criteria shall be properly adjusted for hardness using the hardness of the receiving water.

[2] The CTR requires that, for waters with a hardness of 400 mg/L (as $CaCO_3$), or less, the actual ambient hardness of the surface water must be used. It further requires that the hardness values used must be consistent with the design discharge conditions for design flows and mixing zones.

receiving water hardness, after mixing with the effluent (Order WQO 2008-0008, p. 11). The Regional Water Board thus has considerable discretion in determining ambient hardness (*Id.*, p.10.).

The hardness values must also be protective under all flow conditions (*Id.*, pp. 10-11). As discussed below, scientific literature provides a reliable method for calculating protective hardness-dependent CTR criteria, considering all discharge conditions. This methodology produces criteria that ensure these metals do not cause receiving water toxicity, while avoiding criteria that are unnecessarily stringent.

A 2006 Study[1] developed procedures for calculating the effluent concentration allowance (ECA)[2] for CTR hardness-dependent metals. The 2006 Study demonstrated that it is necessary to evaluate all discharge conditions (e.g. high and low flow conditions) and the hardness and metals concentrations of the effluent and receiving water when determining the appropriate ECA for these hardness-dependent metals. Simply using the lowest recorded upstream receiving water hardness to calculate the ECA may result in over or under protective water quality-based effluent limitations.

The equation describing the total recoverable regulatory criterion, as established in the CTR, is as follows:

$$\text{CTR Criterion} = \text{WER} \times e^{m[\ln(H)]+b} \qquad \text{(Equation 1)}$$

Where:

H = = hardness (as $CaCO_3$)
WER = water-effect ratio
m, b = metal- and criterion-specific constant

In accordance with the CTR, the default value for the WER is 1. A WER study must be conducted to use a value other than 1. The constants "m" and "b" are specific to both the metal under consideration, and the type of total recoverable criterion (i.e., acute or chronic). The metal-specific values for these constants are provided in the CTR at paragraph (b)(2), Table 1.

The equation for the ECA is defined in Section 1.4, Step 2, of the SIP and is as follows:

$$\text{ECA} = C \qquad (\text{when } C \leq B)^3 \qquad \text{(Equation 2)}$$

Where

[1] Emerick, R.W.; Borroum, Y.; & Pedri, J.E., 2006. California and National Toxics Rule Implementation and Development of Protective Hardness Based Metal Effluent Limitations. WEFTEC, Chicago, Ill.
[2] The ECA is defined in Appendix 1 of the SIP (page Apendix 1-2). The ECA is used to calculate water quality-based effluent limitations in accordance with Section 1.4 of the SIP
[3] The 2006 Study assumes the ambient background metals concentration is equal to the CTR criterion (i.e. C ≤ B).

C = the priority pollutant criterion/objective, adjusted for hardness (see Equation 1, above)

B = the ambient background concentration

The 2006 Study demonstrated that the relationship between hardness and the calculated criteria is the same for some metals, so the same procedure for calculating the ECA may be used for these metals. The same procedure can be used for chronic cadmium, chromium III, copper, nickel, and zinc. These metals are hereinafter referred to as "Concave Down Metals". "Concave Down" refers to the shape of the curve represented by the relationship between hardness and the CTR criteria in Equation 1. Another similar procedure can be used for determining the ECA for acute cadmium, lead, and acute silver, which are referred to hereafter as "Concave Up Metals".

<u>ECA for Concave Down Metals</u> – For Concave Down Metals (i.e., chronic cadmium, chromium III, copper, nickel, and zinc) the 2006 Study demonstrates that when the effluent is in compliance with the CTR criteria and the upstream receiving water is in compliance with the CTR criteria, any mixture of the effluent and receiving water will always be in compliance with the CTR criteria. Therefore, based on any observed ambient background hardness, no receiving water assimilative capacity for metals (i.e., ambient background metals concentrations are at their respective CTR criterion) and the minimum effluent hardness, the ECA calculated using Equation 1 with a hardness equivalent to the minimum effluent hardness is protective under all discharge conditions (i.e., high and low dilution conditions and under all mixtures of effluent and receiving water as the effluent mixes with the receiving water). This is applicable whether the effluent hardness is less than or greater than the ambient background receiving water hardness.

The effluent hardness ranged from 82 mg/L to 180 mg/L (as $CaCO_3$), based on 32 samples from April 2004 through March 2008. The upstream receiving water hardness varied from 36 mg/L to 240 mg/L (as $CaCO_3$), based on 36 samples from March 2002 through November 2006. Using a hardness of 82 mg/L (as $CaCO_3$) to calculate the ECA for all Concave Down Metals will result in water quality-based effluent limitations that are protective under all potential effluent/receiving water mixing scenarios and under all known hardness conditions, as demonstrated in the example using copper shown in Table F-5, below. This example assumes the following conservative conditions for the upstream receiving water:

- Upstream receiving water <u>always</u> at the lowest observed upstream receiving water hardness (i.e., 36 mg/L as $CaCO_3$)

- Upstream receiving water copper concentration <u>always</u> at the CTR criteria (i.e., no assimilative capacity).

As demonstrated in Table F-5, using a hardness of 82 mg/L (as $CaCO_3$) to calculate the ECA for Concave Down Metals ensures the discharge is protective under all discha[illegible] and mixing conditions. In this ex[illegible]ple, the effluent is in compliance with the CTR criteria and any mixture of the effluent and receiving water is in compliance with the CTR criteria. An ECA based on a lower hardness (e.g. lowest upstream receiving water hardness) would also be protective, but would result in unreasonably stringent effluent limits considering the known conditions. Therefore, in this Order the ECA for all Concave Down Metals has been calculated using Equation 1 with a hardness of 82 mg/L (as $CaCO_3$).

Table F-5: Copper ECA Evaluation

Minimum Observed Effluent Hardness	**82 mg/L (as $CaCO_3$)**
Minimum Observed Upstream Receiving Water Hardness	**36 mg/L (as $CaCO_3$)**
Maximum Assumed Upstream Receiving Water Copper Concentration	**3.9[1] µg/L**
Copper $ECA_{chronic}$[2]	**7.9 µg/L**

Effluent Fraction	**Mixed Downstream Ambient Concentration**		
	Hardness[3] (mg/L) (as $CaCO_3$)	**CTR Criteria[4] (µg/L)**	**Copper[5] (µg/L)**
1%	36.46	3.9	3.9
5%	38.3	4.1	4.1
15%	42.9	4.5	4.5
25%	47.5	4.9	4.9
50%	59	5.9	5.9
75%	70.5	6.9	6.9
100%	82	7.9	7.9

1 Maximum assumed upstream receiving water copper concentration calculated using Equation 1 for chronic criterion at a hardness of 36 mg/L (as $CaCO_3$).

2 ECA calculated using Equation 1 for chronic criterion at a hardness of 82 mg/L (as $CaCO_3$).

3 Mixed downstream ambient hardness is the mixture of the receiving water and effluent hardness at the applicable effluent fraction.

4 Mixed downstream ambient criteria are the chronic criteria calculated using Equation 1 at the mixed hardness.

5 Mixed downstream ambient copper concentration is the mixture of the receiving water and effluent copper concentrations at the applicable effluent fraction.

<u>ECA for Concave Up Metals</u> – For Concave Up Metals (i.e., acute cadmium, lead, and acute silver), the 2006 Study demonstrates that due to a different relationship between hardness and the metals criteria, the effluent and upstream receiving water can be in compliance with the CTR criteria, but the resulting mixture may be out of compliance. Therefore, the 2006 Study provides a mathematical approach to calculate the ECA to ensure that any mixture of effluent and receiving water is in compliance with the CTR criteria (see Equation 3, below). The ECA, as calculated using Equation 3, is based on the reasonable worst-case ambient background hardness, no receiving water assimilative capacity for metals (i.e., ambient background metals concentrations are at their respective CTR criterion), and the minimum observed effluent hardness. The reasonable worst-case ambient background hardness depends on whether the

effluent hardness is greater than or less than the upstream receiving water hardness. There are circumstances where the conservative ambient background hardness assumption is to assume that the upstream receiving water is at the highest observed hardness concentration. The conservative upstream receiving water condition as used in the Equation 3 below is defined by the term H_{rw}

(Equation 3)

m, b = criterion specific constants (from CTR)

H_e = minimum observed effluent hardness

H_{rw} = minimum observed upstream receiving water hardness when the minimum effluent hardness is always greater than observed upstream receiving water hardness ($H_{rw} < H_e$)

-or-

maximum observed upstream receiving water hardness when the minimum effluent hardness is always less than observed upstream receiving water hardness ($H_{rw} > H_e$)

A similar example as was done for the Concave Down Metals is shown for silver, a Concave Up Metal, in Table F-6 through F-9, below. As previously mentioned, the minimum effluent hardness is 82 mg/L (as $CaCO_3$), while the upstream receiving water hardness ranged from 36 mg/L to 240 mg/L (as $CaCO_3$). In this case, the minimum effluent concentration is within the range of observed upstream receiving water hardness concentrations. Therefore, Equation 3 was used to calculate two ECAs, one based on the minimum observed upstream receiving water hardness and one based on the maximum observed upstream receiving water hardness. Using the assumption of no assimilative capacity at the maximum upstream receiving water hardness results in a negative ECA, which means that not all mixtures of the effluent and receiving water would be in compliance with the CTR criteria if there was no assimilative capacity in the upstream receiving water based on the maximum upstream receiving water hardness. However, calculating the ECA assuming there is no assimilative capacity at the maximum upstream receiving water hardness is not supported by the data. As shown in Table F-7, the maximum upstream receiving water hardness of 240 mg/L (as $CaCO_3$) corresponds to a receiving water concentration for silver of 18.3 µg/L. But, based on the 5 receiving water samples obtained, silver was not detected and the method detection levels ranged from <0.12 µg/L to <1 µg/L, which demonstrates there is assimilative capacity under those conditions. Therefore, in Table F-8, the ECA has been iteratively determined assuming the minimum observed upstream receiving water hardness, a maximum upstream silver concentration 0.5 µg/L (i.e., ½ of the maximum method detection limit), and the effluent at the minimum observed hardness. As shown in Table F-8, the calculated acute ECA for silver is 2.7 µg/L. Similarly, in Table F-9, the ECA is calculated using the maximum upstream silver concentration of 0.5 µg/L with maximum observed upstream receiving water hardness, and the effluent at the minimum observed hardness. Using the maximum upstream receiving water hardness, the calculated acute ECA for silver is 2.9 µg/L. In comparing the ECAs calculated in Tables F-8 and F-9, the results from using the minimum upstream hardness are controlling and the limiting acute ECA for silver is 2.7 µg/L.

Table F-6: Silver ECA Evaluation Using Minimum Receiving Water Hardness

Minimum Observed Effluent Hardness	**82 mg/L** (as $CaCO_3$)
Minimum Observed Upstream Receiving Water Hardness	**36 mg/L** (as $CaCO_3$)
Maximum Assumed Upstream Receiving Water Silver Concentration	**0.7[1] µg/L**
Silver ECA_{acute}[2]	**2.2 µg/L**

Effluent Fraction	Mixed Downstream Ambient Concentration		
	Hardness[3] (mg/L) (as $CaCO_3$)	CTR Criteria[4] (µg/L)	Silver[5] (µg/L)
1%	36.5	0.7	0.7
5%	38.3	0.8	0.8
15%	42.9	0.9	0.9
25%	47.5	1.1	1.1
50%	59	1.6	1.5
75%	70.5	2.2	1.9
100%	82	2.9	2.2

1 Minimum assumed upstream receiving water silver concentration calculated using Equation 1 for acute criterion at a hardness of 36 mg/L (as $CaCO_3$).

2 ECA calculated using Equation 3 for acute criterion.

3 Mixed downstream ambient hardness is the mixture of the receiving water and effluent hardness at the applicable effluent fraction.

4 Mixed downstream ambient criteria are the acute criteria calculated using Equation 1 at the mixed hardness.

5 Mixed downstream ambient silver concentration is the mixture of the receiving water and effluent silver concentrations at the applicable effluent fraction.

Table F-7: Silver ECA Evaluation Using Maximum Receiving Water Hardness

Minimum Observed Effluent Hardness	82 mg/L (as $CaCO_3$)
Maximum Observed Upstream Receiving Water Hardness	240 mg/L (as $CaCO_3$)
Maximum Assumed Upstream Receiving Water Silver Concentration	18.1[1] µg/L
Silver ECA_{acute}[2]	**-2.4 µg/L**

Effluent Fraction	Mixed Downstream Ambient Concentration		
	Hardness[3] (mg/L) (as $CaCO_3$)	CTR Criteria[4] (µg/L)	Silver[5] (µg/L)
0%	240	18.3	18.3
5%	232.1	17.3	17.5
15%	216.3	15.3	15.9
25%	200.5	13.4	14.3
50%	161.0	9.2	10.3
75%	121.5	5.7	6.3
100%	82.0	2.9	2.2

1 Maximum assumed upstream receiving water silver concentration calculated using Equation 1 for acute criterion at a hardness of 240 mg/L (as $CaCO_3$).

2 ECA calculated using Equation 3 for acute criteria.

3 Mixed downstream ambient hardness is the mixture of the receiving water and effluent hardness at the applicable effluent fraction.

4 Mixed downstream ambient criteria are the acute criteria calculated using Equation 1 at the mixed hardness.

5 Mixed downstream ambient silver concentration is the mixture of the receiving water and effluent silver concentrations at the applicable effluent fraction.

Table F-8: Silver ECA Iterative Evaluation assuming Assimilative Capactiy

Minimum Observed Effluent Hardness	**82 mg/L** (as $CaCO_3$)
Minimum Observed Upstream Receiving Water Hardness	**36 mg/L** (as $CaCO_3$)
Maximum Assumed Upstream Receiving Water Silver Concentration	**0.5[1] µg/L**
Silver ECA_{acute}[2]	**2.7 µg/L**

Silver ECA_{acute}[2]			**CTR Equation**	**Iterative Calculations**
	Mixed Downstream Ambient Concentration			
Effluent Fraction	**Hardness[3] (mg/L)** (as $CaCO_3$)	**CTR Criteria[4] (µg/L)**	**Silver[5] (µg/L)**	**Silver[5] (µg/L)**
1%	36.5	0.7	0.5	0.5
5%	38.3	0.8	0.6	0.6
15%	42.9	0.9	0.9	0.8
25%	47.5	1.1	1.1	1.1
50%	59.0	1.6	1.7	1.6
75%	70.5	2.2	2.3	2.2
100%	82.0	2.9	2.9	2.7

1 Maximum upstream receiving water silver concentration based on monitoring data obtained from April 2004 through August 2008.

2 ECA iterative calculation using Equation 3 for acute criteria.

3 Mixed downstream ambient hardness is the mixture of the receiving water and effluent hardness at the applicable effluent fraction.

4 Mixed downstream ambient criteria are the acute criteria calculated using Equation 1 at the mixed hardness.

5 Mixed downstream ambient silver concentration is the mixture of the receiving water and effluent silver concentrations at the applicable effluent fraction.

Table F-9: Silver ECA Iterative Evaluation assuming Assimilative Capactiy

Minimum Observed Effluent Hardness			82 mg/L (as $CaCO_3$)	
Maximum Observed Upstream Receiving Water Hardness			240 mg/L (as $CaCO_3$)	
Maximum Assumed Upstream Receiving Water Silver Concentration			0.5[1] µg/L	
Silver ECA_{acute}[2]			2.9 µg/L	
Silver ECA_{acute}[2]			CTR Equation	Iterative Calculations
	Mixed Downstream Ambient Concentration			
Effluent Fraction	Hardness[3] (mg/L) (as $CaCO_3$)	CTR Criteria[4] (µg/L)	Silver[5] (µg/L)	Silver[5] (µg/L)
0%	240	18.3	0.5	--
5%	232.1	17.3	0.6	--
15%	216.3	15.3	0.9	--
25%	200.5	13.4	1.1	--
50%	161.0	9.2	1.7	--
75%	121.5	5.7	2.3	--
100%	82.0	2.9	2.9	--

1 Maximum upstream receiving water silver concentration based on monitoring data obtained from April 2004 through August 2008.

2 ECA iterative calculation using Equation 3 for acute criteria, for these conditions limited by the acute criterion at hardness of 82 mg/L (as $CaCO_3$).

3 Mixed downstream ambient hardness is the mixture of the receiving water and effluent hardness at the applicable effluent fraction.

4 Mixed downstream ambient criteria are the acute criteria calculated using Equation 1 at the mixed hardness.

5 Mixed downstream ambient silver concentration is the mixture of the receiving water and effluent silver concentrations at the applicable effluent fraction. Iterations not necessary, as the silver concentrations are below the CTR criteria in all cases.

Using Equation 3 to calculate the ECA for all Concave Up Metals will result in water quality-based effluent limitations that are protective under all potential effluent/receiving water mixing scenarios and under all known hardness conditions, as previously demonstrated in Table F-6 for silver. In this example, the effluent is in compliance with the CTR criteria and any mixture of the effluent and receiving water is in compliance with the CTR criteria. Use of a lower ECA (e.g., calculated based solely on the lowest upstream receiving water hardness) is also protective, but would lead to unreasonably stringent effluent limits considering the known conditions. Therefore, Equation 3 has been used to calculate the ECA for all Concave Up Metals in this Order.

d. **Conversion Factors.** The CTR contains aquatic life criteria for arsenic, cadmium, chromium III, chromium VI, lead, nickel, silver, and zinc which are presented in dissolved concentrations. USEPA recommends conversion factors to translate dissolved concentrations to total concentrations. The default USEPA conversion factors contained in Appendix 3 of the SIP were used to convert the applicable dissolved criteria to total recoverable criteria, except for copper. For copper, as allowed by section 1.4.1 of the SIP, site-specific translators were used (see section 3.d.iii below).

e. **Assimilative Capacity/Mixing Zone.** The CWA directs states to adopt water quality standards to protect the quality of its waters. USEPA's current water quality standards regulation authorizes states to adopt general policies, such as mixing zones, to implement state water quality standards (40 CFR 122.44 and 122.45). The USEPA allows states to have broad flexibility in designing its mixing zone policies. Primary policy and guidance on determining mixing zone and dilution credits is provided by the *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays and Estuaries of California* (State Implementation Policy or SIP) and the Basin Plan. If no procedure applies in the SIP or the Basin Plan, then the Regional Water Board may use the USEPA *Technical Support Document for Water Quality-Based Toxics Control* (EPA/505/2-90-001) (TSD).

The allowance of mixing zones by the Regional Water Board is discussed in the Basin Plan, Policy for Application of Water Quality Objectives, which states in part, "*In conjunction with the issuance of NPDES and storm water permits, the Regional Board may designate mixing zones within which water quality objectives will not apply provided the discharger has demonstrated to the satisfaction of the Regional Board that the mixing zone will not adversely impact beneficial uses. If allowed, different mixing zones may be designated for different types of objectives, including, but not limited to, acute aquatic life objectives, chronic aquatic life objectives, human health objectives, and acute and chronic whole effluent toxicity objectives, depending in part on the averaging period over which the objectives apply. In determining the size of such mixing zones, the Regional Board will consider the applicable procedures and guidelines in the EPA's Water Quality Standards Handbook and the TSD. Pursuant to EPA guidelines, mixing zones designated for acute aquatic life objectives will* *generally be limited to a small zone of initial dilution in the immediate vicinity of the discharge.*"

Section 1.4.2 of the SIP states, in part, "*...with the exception of effluent limitations derived from TMDLs, in establishing and determining compliance with effluent limitations for applicable human health, acute aquatic life, or chronic aquatic life priority pollutant criteria/objectives or the toxicity objective for aquatic life protection in a basin plan, the Regional Board may grant mixing zones and dilution credits to dischargers ... The applicable priority pollutant criteria and objectives are to be met throughout a water body except within any mixing zone granted by the Regional Board. The allowance of mixing zones is discretionary and shall be determined on a discharge-by-discharge basis. The Regional Board may consider allowing mixing zones and dilution credits only for discharges with a physically identifiable point of discharge that is regulated through an NPDES permit issued by the Regional Board.*"

For completely-mixed discharges, the Regional Water Board may grant a mixing zone and apply a dilution credit in accordance with Section 1.4.2.1 of the SIP. For incompletely-mixed discharges, the Discharger must perform a mixing zone study to demonstrate to the Regional Water Board that a dilution credit is appropriate. In granting a mixing zone, the SIP states that a mixing zone shall be as small as practicable, and meet the conditions provided in Section 1.4.2.2 as follows:

"*A mixing zone shall be as small as practicable. The following conditions must be met in allowing a mixing zone:*

A: A mixing zone shall not:

- *(1) compromise the integrity of the entire water body;*
- *(2) cause acutely toxic conditions to aquatic life passing through the mixing zone;*
- *(3) restrict the passage of aquatic life;*
- *(4) adversely impact biologically sensitive or critical habitats, including, but not limited to, habitat of species listed under federal or State endangered species laws;*
- *(5) produce undesirable or nuisance aquatic life;*
- *(6) result in floating debris, oil, or scum;*
- *(7) produce objectionable color, odor, taste, or turbidity;*
- *(8) cause objectionable bottom deposits;*
- *(9) cause nuisance;*
- *(10) dominate the receiving water body or overlap a mixing zone from different outfalls; or*
- *(11) be allowed at or near any drinking water intake. A mixing zone is not a source of drinking water. To the extent of any conflict between this determination and the Sources of Drinking Water Policy (Resolution No. 88-63), this SIP supersedes the provisions of that policy.*"

The effluent is discharged through a 36-inch diameter pipe located on the side bank, which provides minimal dilution. The effluent is discharged into a tidally influenced section of the San Joaquin River, in which, under critical low flow conditions, flow reversals may occur on the flood tide and prolonged near-slack water conditions may occur for various combinations of tide and San Joaquin River flow. Flow direction reversals can potentially cause accumulation of effluent and double dosing.

The Discharger developed a model in 2002 to assess dilution and mixing zones. Hydrodynamic modeling was performed using the RMA-10 model and the results were published in *Analysis of the Fate and Water Quality Impacts of the City of Manteca Discharge* (Resource Management Associates, 10 October 2000). The results of the hydrodynamic modeling were utilized in the water quality analysis that was published in *Water Quality Analysis of Surface Water Discharge* (Larry Walker Associates, October 2000). These studies demonstrated that at the permitted design flow of 9.87 mgd, the minimum dilution for chronic aquatic life criteria was 4:1 with a mixing zone that hugs the eastern shore and extends 450 feet north of the outfall, and as a result, Order No. R5-2004-0028 granted a 4:1 dilution credit for chronic aquatic criteria constituents. For human health criteria, Order No. R5-2004-0028 granted a dilution credit up to 222:1 based on safe-exposure levels for lifetime exposure utilizing the harmonic mean flow at Vernalis. But for the acute aquatic criteria, the Regional Water Board in Order No. R5-2004-0028 did not designate any dilution within the immediate vicinity of the outfall because of the limited mixing of the side-bank discharge near the outfall and the periods of slack tide that can occur at low river flows. The accuracy of the model results was questionable due in part to a lack of site data to calibrate and validate the model, and therefore, Order No. R5-2004-0028 also required the Discharger to install a flow monitoring station in the vicinity of the outfall to provide real-time data to better assess available dilution.

In 2006, the Discharger also developed a dilution study (*Near and Far Field Dilution Analysis of the Manteca Wastewater Discharge,* Resource Management Associates, October 2006) that expanded the 2002 modeling work to include atmospheric thermal exchange and field investigations. The field investigations updated the model bathymetry, and allowed calibration and validation of the plume geometry calculations. The modeling and field studies presented a spatial definition to the changes in temperature that occur in the receiving water, which was used to define a mixing zone for constituents subject to chronic aquatic and human health criterion, and dilution to be determined at the edge of the mixing zones. However, for acute aquatic criteria, the modeling and field studies demonstrated that there is limited dilution within the immediate vicinity of the outfall. Therefore, based on these findings, and that the Discharger did not provide any additional information, this Order does not allow a mixing zone nor grant dilution credits for acute aquatic criteria.

Additionally, the 2006 modeling work for chronic simulations was performed utilizing the San Joaquin River flow conditions set at the 7Q10 of 615 cfs. The dilution modeling and analysis demonstrated that the minimum dilution for chronic aquatic life criteria at the permitted design flow of 9.87 mgd was 2:1 and at the 17.5 mgd was 1:1, with a mixing zone that extends 4100 feet north of the outfall. Based on these findings, this Order does not allow a mixing zone nor grant dilution credits for chronic aquatic criteria to provide protection to the benthic community and to minimize the impacts of the discharge to the San Joaquin River.

Finally, for the Human Health criteria, the resultant analysis based on this dilution study demonstrated that at 5280 feet north of the discharge a dilution credit for the flow of 9.87 mgd was 93:1 and for the flow of 17.5 mgd was 52:1, and that concentrations become fully mixed across the channel cross-section at approximately 5400 feet north of the outfall. This is appropriate, because for long-term human health criteria, the environmental effects are expected to occur far downstream of the discharge point where the discharge is completely mixed. Furthermore, the mixing zone is as small as practicable, will not compromise the integrity of the entire water body, restrict the passage of aquatic life, dominate the waterbody or overlap existing mixing zones from different outfalls. The discharge is approximately 20 miles from the nearest drinking water intake. Based on these findings, this Order grants human health dilution credits on a case-by-case basis.

3. **Determining the Need for WQBELs**

   a. The Regional Water Board conducted the RPA in accordance with section 1.3 of the SIP for most constituents and based on TSD guidance, where appropriate. Although the SIP applies directly to the control of CTR priority pollutants, the State Water Board has held that the Regional Water Board may use the SIP as guidance for water quality-based toxics control.[1] The SIP states in the introduction "*The goal of this Policy is to establish a standardized approach for permitting discharges of toxic pollutants to non-ocean surface waters in a manner that promotes statewide consistency.*" Therefore, in this Order the RPA procedures from the SIP were used in most cases to evaluate reasonable potential for both CTR and non-CTR constituents based on information submitted as part of the application, in studies, and as directed by monitoring and reporting programs. Unless otherwise stated, the RPA for each constituent was conducted based on effluent data since Facility upgrades in September 2007 through December 2008, and ambient background monitoring data obtained from 27 April 2004 to 30 December 2008 (hereafter referred to as the "RPA dataset").

   b. **Constituents with Limited Data.** Reasonable potential cannot be determined for the following constituents because representative effluent data are limited, that is data obtained since Facility upgrades, or ambient background concentrations are not available. The Discharger is required to continue to monitor for these constituents in the effluent using analytical methods that provide the best feasible detection limits. When additional data become available, further analysis will be conducted to determine whether to add numeric effluent limitations or to continue monitoring.

[1] See Order WQO 2001-16 (Napa) and Order WQO 2004-0013 (Yuba City).

i. **Benzidine.** Out of 5 samples collected annually during the years 2004 through 2008, concentrations of Benzidine was estimated (J-flag) in the effluent at 3 µg/L in May 2005. The method detection level was 0.1 µg/L and the reporting level was 5 µg/L. No traces (non-detects) of Benzidine were detected, or estimated, in the remaining four samples, or in the five receiving water samples obtained during this same period.

Benzidine is a semivolatile organic that is a manufactured chemical used mostly in dyes; however, it is no longer produced in the U.S. Since there are no known sources of Benzidine, and because Benzidine has never been detected in any other sampling results, the Regional Water Board determined that the May 2005 sample is a suspect outlier and is likely not representative of the effluent discharge. The Regional Water Board is not establishing effluent limitations for Benzidine at this time. However, this Order requires Benzidine effluent samples taken monthly for one full year, and includes a reopener should the effluent discharge demonstrate reasonable potential.

ii. **beta-Benzenehexachloride (byproduct of lindane).** Out of 5 samples collected annually during the years 2004 through 2008, beta-Benzenehexachloride (beta-BHC) was detected once in the effluent at 0.043 µg/L in April 2004. No traces (non-detects) of beta-BHC were detected, or estimated, in the remaining 4 samples, or in the 5 receiving water samples obtained during this same period. Because the Facility currently provides tertiary-level treatment, and since beta-BHC has not been detected in the effluent discharge, the Regional Water Board determined that the April 2004 sample is likely not representative of the effluent discharge now.

Beta-BHC is a product of lindane breakdown. Lindane is a persistent chlorinated hydrocarbon pesticide that has been found in rice soils; however, effective 1 July 2007, USEPA canceled all (manufacturing) uses of lindane, and the last use date for existing stocks is 1 October 2009. Lindane has the propensity to adsorb to suspended solids and sediment in water, and therefore, filtration is an effective method of removal of both lindane, and its byproduct beta-BHC. The Regional Water Board is not establishing effluent limitations for beta-BHC at this time. However, this Order requires beta-BHC effluent samples taken monthly for one full year, and includes a reopener should the effluent discharge demonstrate reasonable potential.

c. **Constituents with No Reasonable Potential.** WQBELs are not included in this Order for constituents that do not demonstrate reasonable potential (see Attachment G. Reasonable Potential Analysis); however, monitoring for those pollutants is established in this Order as required by the SIP. If the results of effluent monitoring demonstrate reasonable potential, this Order may be reopened and modified by adding an appropriate effluent limitation. Based on new data and the procedures established in Section 1.3 of the SIP for determining reasonable potential, the discharge does not demonstrate reasonable potential to cause or contribute to an in-stream excursion for the following constituents:

i. **2,4,6-Trichlorophenol.** The CTR includes a 2,4,6-Trichlorophenol criterion of 2.1 µg/L for the protection of human health and is based on a one-in-a-million cancer risk for waters from which both water and organisms are consumed. Based on the RPA dataset, 2,4,6-Trichlorophenol was not detected (less than reporting level of 1 µg/L) in twelve effluent samples and 2,4,6-Trichlorophenol was not detected (less than reporting level of 0.2 µg/L) in seventeen upstream samples. Therefore, the discharge does not demonstrate reasonable potential to cause or contribute to an in-stream excursion above the CTR water quality criterion for 2,4,6-Trichlorophenol (see Attachment G. Reasonable Potential Analysis).

ii. **Arsenic.** The primary maximum contaminant level for arsenic is 10 µg/L. Based on the RPA dataset, the MEC for arsenic in sixteen effluent samples was 8 µg/L. The maximum concentration observed in twenty-two upstream samples was 3.7 µg/L. Based on this new data and the procedures established in Section 1.3 of the SIP for determining reasonable potential, the discharge does not demonstrate reasonable potential to cause or contribute to an in-stream excursion above the Basin Plan water quality objectives for chemical constituents (see Attachment G. Reasonable Potential Analysis).

iii. **Bis (2-ethylhexyl) Phthalate**. Out of 12 samples obtained from September 2007 through August 2008, bis (2-ethylhexyl) phthalate was estimated (J-flagged) once in the effluent at 2 µg/L; and out of 17 ambient background monitoring samples obtained from April 2004 through October 2008, it was also estimated (J-flagged) once in the receiving water at 2 µg/L. For both of these effluent and receiving water samples, the method detection level was 0.9 µg/L and the reporting level was 5 µg/L.
Bis (2-ethylhexyl) phthalate is a common contaminant of sample containers, sampling apparatus, and analytical equipment, and sources of the detected bis (2-ethylhexyl) phthalate may be from plastics used for sampling or analytical equipment. The Discharger did not collect the samples using clean hands/dirty hands techniques. Therefore, the Regional Water Board finds that the data is suspect and is not establishing effluent limitations for bis (2-ethylhexyl) phthalate at this time. Due to the suspect detections in the effluent and receiving water, this Order requires bis (2-ethylhexyl) phthalate samples taken using clean hands/dirty hands procedures and requires monthly effluent monitoring. This Order also includes a reopener provision should the effluent discharge demonstrate reasonable potential.

iv. **Bromodichloromethane.** The CTR includes a bromodichloromethane criterion of 0.56 µg/L for the protection of human health and is based on a one-in-a-million cancer risk for waters from which both water and organisms are consumed. Based on the RPA dataset, bromodichloromethane was not detected (less than reporting level of 0.1 µg/L) in twelve effluent samples and bromodichloromethane was estimated once at 0.3 µg/L (greater than reporting level of 0.1 µg/L but less than method detection level of 0.5 µg/L) in eighteen upstream samples. Based on this data and the procedures established in Section 1.3 of the SIP for determining reasonable potential, the discharge does not demonstrate reasonable potential to cause or contribute to an in-stream excursion above CTR water quality criterion for bromodichloromethane (see Attachment G. Reasonable Potential Analysis).

v. **Chlorine Residual.** Since the Facility upgrade to UV disinfection, chlorine has not been detected (less than 0.00 mg/L) in 277 effluent samples. Therefore, based on this data and the change in the disinfection process that eliminated the use of chlorine, the discharge does not demonstrate reasonable potential to cause or contribute to an in-stream excursion above the Basin Plan narrative toxicity objective. The Discharger does not currently use chlorine in any maintenance activities at the Facility; however, the Discharger requested the option to use chlorine in the maintenance of the UV disinfection system when needed; therefore, this Order requires monitoring during occurrences when chlorine is used in the Facility's maintenance activities.

vi. **Cyanide.** The CTR includes cyanide criteria for the protection of freshwater aquatic life of 5.2 µg/L (maximum 4-day average concentration) and 22 µg/L (maximum 1-hour average concentration). Based on the RPA dataset, cyanide was not detected (less than reporting levels of 2.0 µg/L) in sixteen effluent samples and the maximum upstream receiving water concentration in fifteen samples was 5 µg/L. Based on this data and the procedures established in Section 1.3 of the SIP for determining reasonable potential, the discharge does not demonstrate reasonable potential to cause or contribute to an in-stream excursion above CTR water quality criteria for cyanide.

vii. **Dibromochloromethane.** The CTR includes a criterion for dibromochloromethane of 0.41 µg/L for the protection of human health and is based on a one-in-a-million cancer risk for waters from which both water and organisms are consumed. Based on the RPA dataset dibromochloromethane was not detected (less than reporting levels of 0.08 µg/L) in twelve effluent samples and dibromochloromethane was estimated once at 0.2 µg/L (greater than reporting levels of 0.1 µg/L but less than method detection level of 0.3 µg/L) in eighteen upstream receiving water samples. Based on this data and the procedures established in Section 1.3 of the SIP for determining reasonable potential, the discharge does not demonstrate reasonable potential to cause or contribute to an in-stream excursion above the CTR water quality criterion for dibromochloromethane.

viii. **Iron.** The Basin Plan contains a site-specific water quality objective for iron for the Sacramento-San Joaquin Delta of 300 µg/L (dissolved). Based on effluent data since Facility upgrades in September 2007 through December 2008, and ambient background monitoring data obtained from 27 April 2004 to 30 December 2008, the MEC for iron was 49 µg/L (total recoverable) and the maximum concentration observed in thirteen upstream receiving water samples was 4700 µg/L (total recoverable). Using only total recoverable iron data and assuming a dissolved-to-total metal translator of 1.0, the maximum receiving water iron concentration exceeds the Basin Plan's site-specific objective for the Sacramento-San Joaquin Delta. However, the State Water Board has upheld that a chemical translator can be applied to make the conversion between the limits on the dissolved concentration of a regulated constituent and the total concentration in the effluent[1]. Therefore, because iron is present in the sediment, which can result in significant differences between total and dissolved iron concentrations, the Discharger conducted a one-year study (August 2005 through July 2006) to characterize the dissolved iron concentrations in the receiving water. During this study, monthly samples were obtained from the effluent and the San Joaquin River, and analyzed for total recoverable and dissolved iron concentrations. The MEC for iron observed during the study was 90 µg/L (dissolved) and 180 µg/L (total), and the maximum iron concentration observed in the San Joaquin River during this same period was 190 µg/L(dissolved) and 4400 µg/L (total). The data is shown below in Table F-10.

[1] See Order WQO 2005-005 (Manteca).

Table F-10: Iron Study Results

Date	Effluent Iron (µg/L)		San Joaquin River Iron (µg/L)	
	Dissolved	Total	Dissolved	Total
8/23/05	<50	70	<50	1100
9/27/05	<50	120	<50	1900
11/22/05	<50	90	<50	1000
12/21/05	90	90	<50	1300
1/3/06	<50	120		
1/4/06			80	4400
2/1/06	<50	50	<50	850
" "			<50	480
3/15/06	<50	180	<50	1600
4/26/06		70	190	9300
5/9/06	<50	70	90	1100
5/16/06	<50	<50		
5/17/06			80	1100
6/5/06	<50	70		
6/6/06			90	1700
7/4/06	<50	<50		
7/5/06			60	2400

This data confirms that it is not reasonable to assume a dissolved-to-total metal translator of 1.0, particularly for the receiving water. Therefore, since there is adequate dissolved iron data to conduct the RPA, the analysis was performed using the dissolved data. Based on the dissolved data, the discharge does not have reasonable potential to cause or contribute to an in-stream exceedance of the Basin Plan's site-specific dissolved iron objective. Therefore, water quality-based effluent limitations are not necessary.

ix. **Manganese**. The Basin Plan contains a site-specific water quality objective for manganese for the Sacramento-San Joaquin Delta of 50 µg/L (dissolved). Based on effluent data since Facility upgrades in September 2007 through December 2008, and ambient background monitoring data obtained from 27 April 2004 to 30 December 2008, the MEC for manganese was 25.7 µg/L (total recoverable) and the maximum concentration observed in thirteen upstream samples was 230 µg/L (total recoverable). Using only total recoverable manganese data and assuming a dissolved-to-total metal translator of 1.0, the maximum receiving water manganese concentration exceeds the Basin Plan's site-specific dissolved manganese objective for the Sacramento-San Joaquin Delta. . However, the State Water Board has upheld that a chemical translator can be applied to make the conversion between the limits on the dissolved concentration of a regulated constituent and the total concentration in the effluent[1]. Therefore, because manganese is present in the sediment, which can result in significant differences between total and dissolved manganese, the Discharger conducted a study for one

[1] See Order WQO 2005-005 (Manteca).

year (August 2005 through July 2006) to characterize the dissolved manganese concentrations in the receiving water. During this study, monthly samples were obtained from the effluent and the San Joaquin River, and analyzed for total recoverable and dissolved manganese concentrations. The MEC for manganese observed during the study was 20 µg/L (dissolved) and 25 µg/L (total), and the maximum manganese concentration observed in the San Joaquin River during this same period was 47 µg/L (dissolved) and 200 µg/L (total). The data is shown below in Table F-11.

Table F-11: Manganese Study Results

Date	Effluent Manganese (µg/L)		San Joaquin River Manganese (µg/L)	
	Dissolved	Total	Dissolved	Total
8/23/05	<50	8.1	<50	80
9/27/05	8.5	16	8.2	110
11/22/05	8.3	15	47	100
12/21/05	20	25	14	130
1/3/06	16	23		
1/4/06			26	200
2/1/06	6.3	12	7.9	72
" "			6.9	64
3/15/06	14	21	<5	68
4/26/06		13	12	42
5/9/06	5.7	9.9	19	52
5/16/06	5	6.6		
5/17/06			16	48
6/5/06	6	8.8		
6/6/06			8.4	81
7/4/06	9.4	12		
7/5/06			18	190

This data confirms that it is not reasonable to assume a dissolved-to-total metal translator of 1.0. Therefore, since there is adequate dissolved manganese data to conduct the RPA, the analysis was performed using the dissolved data. Based on the dissolved data, the discharge does not have reasonable potential to cause or contribute to an in-stream exceedance of the Basin Plan's site-specific dissolved manganese objective. Therefore, water quality-based effluent limitations are not necessary.

x. **Oil and Grease**. Order No. R5-2004-0028 requires that the effluent comply with a monthly average effluent limit of 10 mg/L and a daily maximum effluent limit of 15 mg/L to implement the Basin Plan's narrative objective for oil and grease. Based on the RPA dataset, the MEC for oil and grease in twenty effluent samples was 0.7 mg/L and the highest monthly average concentrations was 0.6 mg/L. Based on this data since the Facility upgrades and the procedures established in Section 1.3 of the SIP for determining reasonable potential, the discharge no longer demonstrates reasonable potential to cause or contribute to an in-stream excursion above the Basin Plan's narrative objective for oil and grease and floating material. Therefore, this Order does not contain WQBELs for oil and grease. However, effluent monitoring for oil and grease is required and a receiving water limitation is included that prohibits the discharge to cause "Oils, greases, waxes, or other materials to be present in concentrations that cause nuisance, result in a visible film or coating on the surface of the water or on objects in the water, or otherwise adversely affect beneficial uses."

xi. **Settleable Solids**. Order No. R5-2004-0028 requires that the effluent comply with a daily maximum effluent limitation of 0.2 ml/L and a monthly average effluent limit of 0.1 ml/L for settleable solids to implement the Basin Plan's narrative objectives for Settleable Material. Based on the RPA dataset, Settleable Solids was not detected (less than reporting levels of < 0.1 ml/L) in 283 effluent samples obtained since Facility upgrades. Based on the availability of new data and the procedures established in Section 1.3 of the SIP for determining reasonable potential, the discharge no longer demonstrates reasonable potential to cause or contribute to an in-stream excursion above the Basin Plan's narrative objective for Settleable Material. This Order requires effluent monitoring and contains a receiving water limitation for Settleable Substances to prevent deposition of material that causes nuisance or adversely affects beneficial uses.

d. **Constituents with Reasonable Potential.** The Regional Water Board finds that the discharge has a reasonable potential to cause or contribute to an in-stream excursion above a water quality standard for aluminum, ammonia, mercury, methylene blue active substances (MBAS), Nitrate plus nitrite, pathogens, salinity, and temperature. WQBELs for these constituents are included in this Order. A summary of the RPA is provided in Attachment G, and a detailed discussion of the RPA for each constituent is provided below.

i. **Aluminum**

(a) **WQO.** The Secondary MCL for aluminum for the protection of the MUN beneficial use is 200 µg/L. In addition, USEPA developed National Recommended Ambient Water Quality Criteria (NAWQC) for protection of freshwater aquatic life for aluminum. The recommended 4-day average (chronic) and 1-hour average (acute) criteria for aluminum are 87 µg/L and 750 µg/L, respectively, for waters with a pH of 6.5 to 9.0. USEPA recommends that the ambient criteria are protective of the aquatic beneficial uses of receiving waters in lieu of site-specific criteria. However, information contained in the footnotes to the NAWQC indicate that the development of the chronic criterion was based on specific receiving water conditions where there is low pH (below 6.5) and low hardness levels (below 50 mg/L as CaCO3). The San Joaquin River (SJR) has been measured to have hardness values—typically between 56 and 152 mg/L as $CaCO_3$. Because the hardness values in the SJR are higher (which decreases the toxic effects to aquatic life) than the water hardness values in which the criterion was developed, USEPA advises that a water effects ratio (WER) might be appropriate to better reflect the actual toxicity of aluminum to aquatic organisms.

(b) The Discharger submitted its final Aluminum WER Study, *City of Manteca Aluminum Water-Effects Ratio (WER) Study* dated March 2007, which recommends a WER of 22.7 applicable to both the acute and chronic objectives. The WER Study was conducted in accordance with EPA guidance and has been reviewed and determined to be scientifically defensible *(Review of City of Manteca Aluminum Water-Effects Ratio (WER) Study,* 21 June 2007, Tetra Tech, Inc.). However, to be fully protective of the beneficial uses, the Regional Water Board determined that this WER is only applicable to the chronic objectives since the study only reflected the conditions under which the chronic objectives were determined and did not reflect the same conditions under which the acute objectives were determined. Thus, applying the final WER of 22.7 to the acute criterion may be underprotective.

(c) RPA Results. The maximum effluent concentration (MEC) for aluminum was 24.3 µg/L while the maximum observed upstream receiving water concentration was 3300 µg/L. Therefore, aluminum in the discharge has a reasonable potential to cause or contribute to an in-stream excursion above the recommended 4-day average (chronic) and 1-hour average (acute) criteria for aluminum of 87 µg/L and 750 µg/L, respectively.

(d) WQBELs. Applying the final WER of 22.7 to the chronic criterion only, this Order contains a final average monthly effluent limitation (AMEL) and maximum daily effluent limitation (MDEL) for aluminum of 407 µg/L and 750 µg/L, respectively, based on the recommended NAWQC for protection of freshwater aquatic life for aluminum. This Order also contains an annual average effluent limitation of 200 µg/L for aluminum, based on the Secondary MCL for protection of the MUN beneficial use.

(e) Plant Performance and Attainability. Analysis of the effluent data shows that the MEC of 24.3 µg/L is less than the applicable WQBELs. The Regional Water Board concludes, therefore, that immediate compliance with these effluent limitations is feasible.

ii. Ammonia

(a) WQO. The NAWQC for the protection of freshwater aquatic life for total ammonia, recommends acute (1-hour average; criteria maximum concentration or CMC) standards based on pH and chronic (30-day average; criteria continuous concentration or CCC) standards based on pH and temperature. USEPA also recommends that no 4-day average concentration should exceed 2.5 times the 30-day CCC. USEPA found that as pH increased, both the acute and chronic toxicity of ammonia increased. Salmonids were more sensitive to acute toxicity effects than other species. However, while the acute toxicity of ammonia was not influenced by temperature, it was found that invertebrates and young fish experienced increasing chronic toxicity effects with increasing temperature. Because the San Joaquin River within the Sacramento-San Joaquin Delta has a beneficial use of cold freshwater habitat and the presence of salmonids and early fish life stages in the San Joaquin River is well-documented, the recommended criteria for waters where salmonids and early life stages are present were used.

The maximum permitted effluent pH is 8.0, as the Basin Plan objective for pH in the receiving stream is the range of 6.5 to 8.5. In order to protect against the worst-case short-term exposure of an organism, a pH value of 8.0 was used to derive the acute criterion. The resulting acute criterion is 5.62 mg/L.

The maximum observed 30-day rolling average temperature of the effluent and the maximum permitted effluent pH were used to calculate the 30-day CCC. The maximum observed 30-day average effluent temperature was 81.6°F (27.6°C), for the rolling 30-day period ending 31 August 2008. Using the maximum permitted pH value of 8.0 and the worst-case temperature value of 81.6°F (27.6°C) on a rolling 30-day basis, the resulting 30-day CCC is 1.05 mg/L (as N). The 4-day average concentration is derived in accordance with the USEPA criterion as 2.5 times the 30-day CCC. Based on the 30-day CCC of 1.05 mg/L (as N), the 4-day average concentration that should not be exceeded is 2.62 mg/L (as N).

(b) **RPA Results.** Untreated domestic wastewater contains ammonia. Nitrification is a biological process that converts ammonia to nitrite and nitrite to nitrate. Denitrification is a process that converts nitrate to nitrite or nitric oxide and then to nitrous oxide or nitrogen gas, which is then released to the atmosphere. The Discharger does currently use nitrification to remove ammonia from the waste stream. Inadequate or incomplete nitrification may result in the discharge of ammonia to the receiving stream. Ammonia is known to cause toxicity to aquatic organisms in surface waters. Discharges of ammonia would violate the Basin Plan narrative toxicity objective. The maximum effluent concentration (MEC) for ammonia was 2.1 mg/L while the maximum observed upstream receiving water concentration was 0.45 mg/L. Therefore, ammonia in the discharge has a reasonable potential to cause or contribute to an in-stream excursion above the NAWQC.

(c) **WQBELs.** The Regional Water Board calculates WQBELs in accordance with SIP procedures for non-CTR constituents, and ammonia is a non-CTR constituent. The SIP procedure assumes a 4-day averaging period for calculating the long-term average discharge condition (LTA). However, USEPA recommends modifying the procedure for calculating permit limits for ammonia using a 30-day averaging period for the calculation of the LTA corresponding to the 30-day CCC. Therefore, while the LTAs corresponding to the acute and 4-day chronic criteria were calculated according to SIP procedures, the LTA corresponding to the 30-day CCC was calculated assuming a 30-day averaging period. The lowest LTA representing the acute, 4-day CCC, and 30-day CCC is then selected for deriving the average monthly effluent limitation (AMEL) and the maximum daily effluent limitation (MDEL). The remainder of the WQBEL calculation for ammonia was performed according to the SIP procedures. This Order contains a final average monthly effluent limitation (AMEL) and maximum daily effluent limitation (MDEL) for Ammonia of 1.4 mg/L and 3.4 mg/L, respectively, based on the 30-day CCC .

(d) **Plant Performance and Attainability.** Analysis of the effluent data shows that the MEC of 2.1 mg/L and the maximum monthly average effluent concentration of 0.6 mg/L are less than the applicable WQBELs. The Regional Water Board concludes, therefore, that immediate compliance with these effluent limitations is feasible.

iii. Copper.

(a) **WQO.** The CTR contains hardness dependent criteria for copper. Section 1.3 of the SIP contains the requirements for conducting the RPA for CTR constituents. Step 1 of the RPA requires that the CTR criteria be adjusted for hardness, as applicable. In this case, the reasonable worst-case downstream hardness (e.g., represented by the minimum observed effluent hardness, see Section IV.C.2.c) was used to adjust the CTR criteria for copper when comparing the MEC to the criteria and the minimum observed upstream receiving water hardness was used when comparing the maximum background receiving water copper concentrations to the criteria. These criteria are presented in dissolved concentrations. USEPA recommends conversion factors to translate dissolved concentrations to total concentrations. The SIP, section 1.4.1, allows the discharger to complete a defensible site-specific translator study, and propose a dissolved to total recoverable translator. The Discharger conducted a copper translator study, and submitted the final results and recommendations to the Regional Water Board on 31 January 2007, "City of Manteca Copper Monitoring Study Results." The calculations of the acute and chronic translators were based on EPA and SIP guidance, and on the results of simulated 4:1 receiving water effluent samples because Order No. R5-2004-0028 granted a 4:1 dilution credit for chronic aquatic criteria constituents. However, because dilution credits are not granted for chronic aquatic criteria in this Order (see previous section IV.C.2.e of this Fact Sheet), the acute and chronic translators from the study were not used to translate dissolved copper concentrations to total concentrations. The Discharger recalculated the acute and chronic translators based on EPA and SIP guidance, and on the effluent sample results obtained during the translator study. Regional Water Board concurs with the results of the site-specific translator study, and therefore, the acute and chronic translators of 0.78 and 0.70 were used to convert the copper dissolved criteria to total recoverable criteria.

(b) **RPA Results.** For the effluent, the applicable copper chronic criterion (maximum 4-day average concentration) is 7.9 µg/L and the applicable acute criterion (maximum 1-hour average concentration) is 11.6 µg/L, as total recoverable, based on a hardness of 82 mg/L. Out of the 16 samples obtained since the Facility was upgraded to provide tertiary-level treatment in September 2007, the MEC of copper was 4.6 µg/L, which is below the lowest applicable criterion of 7.9 µg/L. For the receiving water, the applicable copper chronic criterion (maximum 4-day average concentration) is 3.9 µg/L and the applicable acute criterion (maximum 1 hour average concentration) is 5.4 µg/L, as total recoverable. Out of the 33 receiving water samples obtained since April 2004 two samples exhibited concentration values above the water quality criteria for total copper, January 2005 at 14 µg/L and January 2006 at 9.0 µg/L. Based on this information, the discharge exhibits reasonable potential to cause or contribute to an in-stream excursion of the CTR criteria for copper.

(c) **WQBELs.** As discussed in detail in Section IV.C.2.c, above, based on the minimum observed effluent and receiving water hardness concentrations, no assimilative capacity for copper in the receiving water, and using the site-specific acute and chronic dissolved-to-total translator of 0.78 and 0.70, respectively, the applicable effluent concentration allowances for total recoverable copper are 10.8 µg/L for the chronic (maximum 4-day average concentration) and 14.3 µg/L for the acute (maximum 1-hour average concentration). Using the procedures for calculating WQBELs in the Section 1.4 of the SIP, results in final effluent limitations for total recoverable copper of 10 µg/L and 13 µg/L, as the AMEL and MDEL, respectively.

(d) **Plant Performance and Attainability.** Analysis of the effluent data shows that the MEC of 4.6 µg/L is less than the applicable WQBELs. The Regional Water Board concludes, therefore, that immediate compliance with these effluent limitations is feasible.

iv. Methylene Blue Active Substances

(a) **WQO.** The Secondary MCL Consumer Acceptance Limit for Methlyene blue active substances (MBAS) is 500 µg/L, which is used to implement the Basin Plan's chemical constituent objective for the protection of municipal and domestic supply.

(b) **RPA Results.** The maximum effluent concentration (MEC) for MBAS was 290 µg/L; MBAS was not monitored in the upstream receiving water samples. However, during the years 1998 to 2002, the MEC for MBAS was 1800 µg/L, and therefore, the City submitted a correction action plan on 29 September 2003. Since then the City's operational changes and Facility upgrades have significantly reduced MBAS concentrations in the discharge. Yet, Regional Water Board staff has still observed some trace foaming in the San Joaquin River from the discharge, Therefore, due to the suspect foaming issues, the Regional Water Board determined that

MBAS in the discharge has a reasonable potential to cause or contribute to an in-stream excursion above the secondary MCL.

(c) **WQBELs.** This Order retains the monthly average effluent limitation for MBAS of 500 µg/L from previous Order No. R5--2004-0028.

(d) **Plant Performance and Attainability.** Analysis of the effluent data shows that the MEC of 290 µg/L is less than the applicable WQBELs. The Regional Water Board concludes, therefore, that immediate compliance with these effluent limitations is feasible.

v. **Mercury**

(a) **WQO.** The current NAWQC for protection of freshwater aquatic life, continuous concentration, for mercury is 0.77 µg/L (30-day average, chronic criteria). The CTR contains a human health criterion (based on a threshold dose level causing neurological effects in infants) of 0.050 µg/L for waters from which both water and aquatic organisms are consumed. Both values are controversial and subject to change. In 40 CFR Part 131, USEPA acknowledges that the human health criteria may not be protective of some aquatic or endangered species and that "*...more stringent mercury limits may be determined and implemented through use of the State's narrative criterion.*" In the CTR, USEPA reserved the mercury criteria for freshwater and aquatic life and may adopt new criteria at a later date.

(b) **RPA Results.** The maximum observed effluent mercury concentration was 0.0042 µg/L. Mercury bioaccumulates in fish tissue and, therefore, the discharge of mercury to the receiving water may contribute to exceedances of the narrative toxicity objective and impact beneficial uses. The San Joaquin River within the southern portion of the Sacramento-San Joaquin Delta Waterways has been listed as an impaired water body pursuant to CWA section 303(d) because of mercury and the discharge must not cause or contribute to increased mercury levels.

(c) **WQBELs.** This Order contains an interim performance-based mass effluent limitation of 0.69 lbs/year for mercury for the effluent discharged to the receiving water. This limitation is based on maintaining the mercury loading at the current level until a total maximum daily load (TMDL) can be established and USEPA develops mercury standards that are protective of human health. The mass limitation was carried over from the previous permit, Order No. R5-2004-0028:

If USEPA develops new water quality standards for mercury, this permit may be reopened and the effluent limitations adjusted.

(d) **Plant Performance and Attainability.** Analysis of the effluent data shows that the MEC of 0.0042 µg/L, which equates to 0.126 lb/year (Calculated as: [Effluent concentration (mg/L)] * [Design average daily flow rate] * [8.34 (conversion factor)] * [365 days] = ___s/year) is less than the applicable limitation. The Regional Water Board concludes, therefore, that immediate compliance with this interim effluent limitation is feasible.

vi. Nitrate plus Nitrite

(a) WQO. DPH has adopted Primary MCLs for the protection of human health for nitrite and nitrate that are equal to 1 mg/L and 10 mg/L (measured as nitrogen), respectively. DPH has also adopted a primary MCL of 10,000 µg/L for the sum of nitrate and nitrite, measured as nitrogen.

USEPA has developed a primary MCL and an MCL goal of 1,000 µg/L for nitrite (as nitrogen). For nitrate, USEPA has developed Drinking Water Standards (10,000 µg/L as Primary MCL) and NAWQC for protection of human health (10,000 µg/L for non-cancer health effects). Recent toxicity studies have indicated a possibility that nitrate is toxic to aquatic organisms.

(b) RPA Results. Untreated domestic wastewater contains ammonia. Nitrification is a biological process that converts ammonia to nitrite and nitrite to nitrate. Denitrification is a process that converts nitrate to nitrite or nitric oxide and then to nitrous oxide or nitrogen gas, which is then released to the atmosphere. Nitrate and nitrite are known to cause adverse health effects in humans. Inadequate or incomplete denitrification may result in the discharge of nitrate and/or nitrite to the receiving stream. The conversion of ammonia to nitrites and the conversion of nitrites to nitrates present a reasonable potential for the discharge to cause or contribute to an in-stream excursion above the Primary MCLs for nitrite and nitrate.

(c) WQBELs. This Order contains a final average monthly effluent limitation for nitrate plus nitrite of 10 mg/L, based on the protection of the Basin Plan's narrative chemical constituents' objective and to assure the treatment process adequately nitrifies and denitrifies the waste stream.

(d) Plant Performance and Attainability. Analysis of the effluent data shows that the MEC for nitrate (as N) of 10.4 µg/L plus nitrite (as N) of 0.017 µg/L obtained since Faciltiy upgrades in September 2007 is slightly greater than the applicable WQBELs. However, the previous permit Order No. R5-2004-0028 contained average monthly effluent limitation for nitrate (as N) of 10 µg/L, and therefore, allowing an intermediate limitation is not consistent with the anti-backsliding requirements of the CWA and federal regulations. Therefore, immediate compliance with this effluent limitation is required in this Order.

vii. **Pathogens**

(a) **WQO.** DPH has developed reclamation criteria, CCR, Division 4, Chapter 3 (Title 22), for the reuse of wastewater. Title 22 requires that for spray irrigation of food crops, parks, playgrounds, schoolyards, and other areas of similar public access, wastewater be adequately disinfected, oxidized, coagulated, clarified, and filtered, and that the effluent total coliform levels not exceed 2.2 MPN/100 mL as a 7-day median. As coliform organisms are living and mobile, it is impracticable to quantify an exact number of coliform organisms and to establish weekly average limitations. Instead, coliform organisms are measured as a most probable number and regulated based on a 7-day median limitation.

Title 22 also requires that recycled water used as a source of water supply for non-restricted recreational impoundments be disinfected tertiary recycled water that has been subjected to conventional treatment. A non-restricted recreational impoundment is defined as *"...an impoundment of recycled water, in which no limitations are imposed on body-contact water recreational activities."* Title 22 is not directly applicable to surface waters; however, the Regional Water Board finds that it is appropriate to apply an equivalent level of treatment to that required by the Department of Public Health's reclamation criteria because the receiving water is used for irrigation of agricultural land and for contact recreation purposes. The stringent disinfection criteria of Title 22 are appropriate since the undiluted effluent may be used for the irrigation of food crops and/or for body-contact water recreation. Coliform organisms are intended as an indicator of the effectiveness of the entire treatment train and the effectiveness of removing other pathogens.

(b) **RPA Results.** The beneficial uses of the San Joaquin River within the Sacramento-San Joaquin Delta include municipal and domestic supply, water contact recreation, and agricultural irrigation supply, and there is, at times, less than 20:1 dilution. To protect these beneficial uses, the Regional Water Board finds that the wastewater must be disinfected and adequately treated to prevent disease. The method of treatment is not prescribed by this Order; however, wastewater must be treated to a level equivalent to that recommended by DPH.

(c) **WQBELs.** In accordance with the requirements of Title 22, this Order includes effluent limitations for total coliform organisms of 2.2 MPN/100 mL as a 7-day median; 23 MPN/100 mL, not to be exceeded more than once in a 30-day period; and 240 MPN/100 mL as an instantaneous maximum.

In addition to coliform limitations, turbidity specifications have been included as a second indicator of the effectiveness of the treatment process and to assure compliance with the required level of treatment. The tertiary treatment process, or equivalent, is capable of reliably meeting a turbidity specification of 2 nephelometric turbidity units (NTU) as a daily average. Failure of the filtration system such that virus removal is impaired would normally result in increased particles in the effluent, which result in higher effluent turbidity. Turbidity has a major advantage for monitoring filter performance, allowing immediate detection of filter failure and rapid corrective action. Coliform testing, by comparison, is not conducted continuously and requires several hours, to days, to identify high coliform concentrations. Thus, monitoring turbidity is a good operational check to ensure the treatment system was functioning properly and could meet the limits for total coliform organisms. Therefore, to ensure compliance with DPH recommended Title 22 disinfection criteria, this Order contains operational turbidity specifications to be met prior to disinfection (See Special Provisions VI.C.4.a Turbidity Operational Requirements in the Limitations and Discharge Requirements section of this Order). To be consistent with current DPH guidance the operational requirements for turbidity have been established as 2 NTU as a daily average, an instantaneous maximum of 10 NTU, and shall not exceed 5 NTU more than 5 percent of the time.

This Order contains effluent limitations and a tertiary level of treatment, or equivalent, necessary to protect the beneficial uses of the receiving water. The Regional Water Board has previously considered the factors in CWC section 13241 in establishing these requirements.

(d) **Plant Performance and Attainability.** Analysis of the effluent data shows that the MEC of 90 MPN/ 100ml is less than the applicable WQBELs. The Regional Water Board concludes, therefore, that immediate compliance with these effluent limitations is feasible.

viii. **Salinity**

(a) **WQO.** The Basin Plan contains a chemical constituent objective that incorporates state MCLs, contains a narrative objective, and contains numeric water quality objectives for electrical conductivity, total dissolved solids, sulfate, and chloride. The State Water Board's Bay-Delta Plan establishes salinity water quality objectives as electrical conductivity at various compliance points in the Sacramento-San Joaquin Delta to protect beneficial uses. The USEPA Ambient Water Quality Criteria for Chloride recommends acute and chronic criteria for the protection of aquatic life. There are no USEPA water quality criteria for the protection of aquatic life for electrical conductivity, total dissolved solids, and sulfate

Table F-12. Salinity Water Quality Criteria/Objectives

Parameter	Secondary MCL	Bay-Delta Plan[1]	Effluent	
			Average	Maximum
EC (µmhos/cm)	900, 1600, 2200	700 (1 Apr – 31 Aug) 1000 (1 Sep – 31 Mar)	731	827
TDS (mg/L)	500, 1000, 1500	N/A	450	500
Sulfate (mg/L)	250, 500, 600	N/A	57	68

Chloride (mg/L)	250, 500, 600	N/A	132	140

[1] Compliance with the Bay-Delta Plan water quality objectives are determined at three monitoring locations in the South Sacramento-San Joaquin Delta, but apply throughout the general geographic area.

(1) **Chloride.** The secondary MCL for chloride is 250 mg/L, as a recommended level, 500 mg/L as an upper level, and 600 mg/L as a short-term maximum. The USEPA Ambient Water Quality Criteria for Chloride recommends acute and chronic criteria of 860 mg/L and 230 mg/L, respectively.

(2) **Electrical Conductivity.** The secondary MCL for EC is 900 µmhos/cm as a recommended level, 1600 µmhos/cm as an upper level, and 2200 µmhos/cm as a short-term maximum. The State Water Board's Bay-Delta Plan establishes water quality objectives that apply to waters of the San Francisco Bay system and the legal Sacramento-San Joaquin Delta. As specified at page 10, "unless otherwise indicated, water quality objectives cited for a general area, such as for the southern Sacramento-San Joaquin Delta, are applicable for all locations in that general area and compliance locations will be used to determine compliance with the cited objectives." The Bay-Delta Plan's salinity objectives for the southern Sacramento-San Joaquin Delta are to protect agricultural irrigation uses, and seasonally varies from 700 µmhos/cm (1 April to 31 August) to 1000 µmhos/cm (1 September to 31 March). These objectives apply to the Facility's discharge.

(3) **Sulfate.** The secondary MCL for sulfate is 250 mg/L as a recommended level, 500 mg/L as an upper level, and 600 mg/L as a short-term maximum.

(4) **Total Dissolved Solids.** The secondary MCL for TDS is 500 mg/L as a recommended level, 1000 mg/L as an upper level, and 1500 mg/L as a short-term maximum.

(b) RPA Results.

(1) **Chloride.** Chloride concentrations in the effluent ranged from 109 mg/L to 140 mg/L, with an average of 132 mg/L. Background concentrations in San Joaquin River ranged from 9 mg/L to 150 mg/L, with an average of 69 mg/L, for 5 samples collected by the Discharger from 27 April 2004 through 30 December 2008. These levels do not exceed the secondary MCL or the USEPA Ambient Water Quality Criteria. Therefore, there is no reasonable potential for chloride.

(2) **Electrical Conductivity.** A review of the Discharger's self-monitoring reports after operation of tertiary filtration/UV disinfection show a maximum monthly average EC concentration of 783 µmhos/cm (MEC) during the months April through August (irrigation season) and a MEC of 827 µmhos/cm during the months September through March (non-

irrigation season). The maximum 30-day average background receiving water EC was 949 µmhos/cm (non-irrigation season) and 763 µmhos/cm (irrigation season). These levels do not exceed the secondary MCL or the non-irrigation season objective in the Bay-Delta Plan; however, these levels exceed the irrigation season (April through August) Bay-Delta Plan salinity objective. Therefore, based on the data cited, the discharge demonstrates reasonable potential to exceed the objective.

(3) **Sulfate.** Sulfate concentrations in the effluent ranged from 43 mg/L to 68 mg/L, with an average of 57 mg/L. Background concentrations in San Joaquin River ranged from 11 mg/L to 170 mg/L, with an average of 75 mg/L. These levels do not exceed the secondary MCL. Therefore, there is no reasonable potential for sulfate.

(4) **Total Dissolved Solids.** The average TDS effluent concentration was 450 mg/L with concentrations ranging from 396 mg/L to 500 mg/L. The background receiving water TDS was measured once at a value of 411 mg/L. These levels do not exceed the secondary MCL. Therefore, there is no reasonable potential for TDS.

(c) **WQBELs.** Previous Order No. R5-2004-0028 originally contained seasonal EC limits of 700 and 1000 µmhos/cm, based on the Bay-Delta Plan objectives. The Discharger petitioned the Order to the State Water Board, in part, regarding the EC limits. In Order WQ 2005-0005 for the City of Manteca (Manteca Order), the State Water Board revised the seasonal EC effluent limits to only 1000 µmhos/cm on a year-round basis. The State Water Board based the revision, in part, on the following findings:

"...although discharge of treated wastewater to the Delta or its tributaries under an NPDES permit can affect EC in the southern Delta, previous State Board decisions and water quality control plans do not discuss treated effluent discharges as a source of salinity in the southern Delta."

"In the present case, the record indicates that the 700 µmhos/cm EC receiving water objective for April through August in the southern Delta frequently is not met, and that requiring the City to comply with an effluent limitation of 700 µmhos/cm EC would not significantly change the EC of water in the southern Delta area. In addition, the State Board's 1991 and 1995 Delta Plans, Revised Water Right Decision 1641, and State Board Resolution No. 2004-0062 all establish that the intended implementation program for meeting the 700 µmhos/cm EC objective was based primarily upon providing increased flows, possible construction of salinity barriers, and reducing the salt load entering the San Joaquin River from irrigation return flows and groundwater."

"The causes and potential solutions to the salinity problems in the southern Delta are highly complex subjects that have received and are